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# TRANSACTIONS

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#### COSTA RICAN DIPTERA

COLLECTED BY PHILIP P. CALVERT, PH.D., 1909-1910

#### INTRODUCTORY REMARKS

BY E. T. CRESSON, JR.

Under this general title it is intended, primarily, to publish the results of studies of the species of this order in the material collected by Dr. and Mrs. Philip P. Calvert in Costa Rica during 1909 and 1910. The papers will be prepared and published as each family or group is worked up. As the Diptera of Costa Rica have been but little studied, and in some families not at all, this work will prove to be a fairly good preliminary treatise upon the dipterous fauna of that region.

The main purpose of Dr. Calvert's visit was the study of the Odonata, and he has already published several interesting papers upon that subject. However, he gave some attention to the collecting of the Micro-Insecta, and it will be observed, by the number of species described in this series, that even a casual collecting along such lines will prove exceedingly interesting. All the types, unless otherwise mentioned, are in the collection at the Academy of Natural Sciences of Philadelphia.

Dr. Calvert has kindly prepared the following list of the localities where this material was collected, with brief descriptions of their topography and general surrounding conditions, which forms a valuable adjunct for the purpose of this work.

#### *Localities where Diptera were collected*

**Alajuela.**—Town on the Costa Rica Railroad on the Pacific slope west of San José. Our collecting was mostly done near the

Hacienda El Brazil, at least one mile north of the town. Altitude about 3100 feet. Country rolling, well watered, mostly pasture land or coffee plantations, trees scattered singly except where they form fringes along the numerous small rivers and streams (Rio Ciruelas, Rio Brazil, etc.). Rio Segundo is a river (and a station on the railroad) east of Alajuela.

**Banana River.**—The collections of November 9, 1909, were made near the upper reservoir for Limon, situated on the left bank of the river above Bearesem West farmhouse of the United Fruit Company, altitude 100 feet or less. Forest (with many small palms in the undergrowth) comes down to this reservoir. The whole region is mostly flat with occasional hillocks and in large part occupied by bananas, but patches of forest remain here and there.

**Cachi.**—A small town on the right bank of the Rio Reventazon east of Cartago, southwest of Juan Viñas. Considerable coffee raised around the town, higher up are pastures, still higher on the hills south and southeast is forest. Altitudes at which collections were made from 3450 feet (at bank of Rio Reventazon) up to 4000 feet. There are three well-marked river terraces, the lowest forming a strip of beautiful meadow with some old forest trees. A few miles west of Cachi, the Reventazon winds through a stretch of cobble-like stones and sand in several channels; collections made here on March 7, 1910.

The Rio Oro is a tributary (on the right bank) of the Reventazon, a little west of Cachi. The vegetation of its valley was quite dense, many forest trees still standing, tree-ferns 15 feet high, phyllodendron on tree trunks, Aroids, etc. (March 8, 1910). The Rio Naranjo, also a tributary (on the right bank) of the Reventazon, is east of Cachi. Where we collected it flows chiefly through open pastures.

**La Carpintera.**—Mountain having several peaks, highest 5700 feet elevation, bounding valley of Guarco (in which Cartago lies) on the west and forming the divide between the Atlantic and Pacific slopes. There is still some undisturbed forest on it, but not on the area collected over on December 4, 1909.

**Cartago.**—Town (of 8000 population previous to earthquake of May, 1910), on Costa Rica Railroad. Altitude 4750 feet. Near the top of the Atlantic slope as traversed by the railroad.

Three miles west (at El Alto) the railroad begins to descend the Pacific slope. Cartago lies in an east and west valley (valley of Guarco), bounded on the north by the volcano of Irazu (11,300 feet) and on the south by lower ranges (Serro de Las Cruces). The country around the town is pasture land, coffee plantations and some other cultivated fields, no forest, country well watered.

**El Alto.**—Altitude 4950 feet. Point on the railroad where the change from the Atlantic to the Pacific slope is made. El Alto is a pass between the southwest side of the volcano Irazu and the northwest side of La Carpintera (a mountain 5700 feet high which bounds on the west the valley in which Cartago lies). Near El Alto station is a flat place among the hills which is swampy, with some standing water, called the Laguna de Ochomogo. There are few trees and no forest near. At this laguna I collected on July 7, 1909.

**Filadelfia.**—(See Rio Tempisque).

**Guacimo.**—June 5, 1909. I collected in the banana fields, in a small clearing in the edge of high forest and also in low wet woods. Do not know from which place the Diptera were collected. Altitude about 350 feet in all three, as the country is fairly level.

**Guapiles.**—June 4, 1909; in the forest south of the town. Altitude 1150 feet. June 5, 1909; along Rio Guapiles flowing through open pastures with here and there fringes of trees and undergrowth along banks; north of town, altitude about 980 feet.

**Florida Road.**—A trail of a few miles west of Guapiles, leading westward into rich tropical forest of mingled deciduous exogenous trees and palms and dense undergrowth. Trees with many parasitic and epiphytic plants. The nearest point to the entrance to this trail is the hacienda of San Jacinto (June 3, 1909).

**Irazú Volcano.**—I have used "Irazú" to cover a large area of land, to the north of Cartago, gradually rising from say 4800 feet altitude to the rim of the highest crater, 11,300 feet altitude. This highest point is 12 miles from Cartago railroad station. All the southern slopes of Irazú, up to about 9000 feet, have been cleared of most of the original evergreen oak forest. From 9000 feet to 10,300 feet on the road from Cartago to the crater was still occupied by the oak forest. Above 10,300 feet the trees are about 10 to 15 feet high and more scattered. (In the oak forest the trees are 50 feet or more in height.) Below 9000 feet, on the

southern slopes the land is mostly in pasture, maize or potatoes. There are many small streams. (I never collected on the north slope of Irazú which is much more wooded.)

The floor of the highest crater of the volcano is about 10,600 feet above sea level; where the trail from Cartago crosses the ridge to descend into the crater, the altitude is about 10,800 feet. The highest point of the whole mountain is on the rim of the highest crater and is 11,300 feet. The various craters—there are ten in all—have much black volcanic sand with blocks of stone of all sizes, and many kinds of plants and even low trees up to 15 feet in height.

**Juan Viñas.**—The railroad station is at 3400 feet altitude and lies in the floor of an old crater, apparently. The most of this crater floor has been marshy and hence called “laguna.” Some ditches have been cut to drain it and others were planned. A large part of the sides of this crater was planted in coffee. The village of Juan Viñas is about two miles from the station at 4000 feet altitude. It lies in the midst of open fields. The “nearer” and “farther” waterfalls were on the railroad track a short distance west of the station. Our headquarters were opposite the station and practically at the same level. A road ran up from the station to the village, another down to the Rio Reventazon and crossed it (2500 feet altitude) by a bridge. (See also under Rio Reventazon.)

The brook in woods near mile post  $74\frac{3}{4}$  of the Costa Rica Railroad, at which collections were made on May 2, 1910, was west of Juan Viñas station, lies in woods with small palms, a few low tree-ferns and arums on its banks and has a less rapid current than many streams of the neighborhood and descends by steps rather than by a continuous slope. Other plants in its immediate neighborhood were wild ginger (*Costus*), heliconias and caladiums. Altitude about 3500 feet.

**Laguna del Dirumbo.**—Also called Laguna del Reventado. A pond of shallow water, formed by natural or artificial barriers, on the upper course of the Rio Reventado on the south side of the volcano Irazu at 9100 feet altitude. It lies in a little flat-bottomed valley, and at the time I collected there (July 13, 1909), was about 100 feet long by 75 or 80 feet wide. There were many evergreen oaks (both dead and living), some bamboos and much

grass. Cattle were grazing not far from the laguna in another part of the same little valley. There were several smaller boggy streams and a second smaller swampy spot. The water of the laguna was clear and cold.

**Liberia.**—Capital of the Province of Guanacaste, on the right bank of the Rio Liberia. Altitude 500 feet. East of the town the river has sandy and clayey banks, 15 to 20 feet high in low water in January, 1910, and sandy beaches, few rocks. On January 10, 1910, collected along the river and along a road running from the left bank of the river between pastures and waste land ("char-rals").

**Peralta.**—The railroad station is at an altitude of 1088 feet. All of my collecting was done at nearly this altitude. Tropical forest with very tall exogenous trees and many palms (both kinds hung with lianas, ferns and mosses) comes close to the tracks. The railroad is near the Rio Reventazon and only a few feet higher, so that in floods the tracks are covered with water. Monkeys, armadillos, toucans, parrakeets and basilisks observed in the vicinity.

**Puntarenas.**—The principal seaport of the Pacific coast and terminus of the Pacific Railroad, at the tip of a sandy peninsula between the Gulf of Nicoya and the "Estero." Two kilometers inland from the two is a mangrove swamp, the trees about 15 feet high, the soil between them firm enough to walk on in February 2, 1910, when we collected there and also on the sandy beach of the Gulf of Nicoya.

**Quebrada de Panteon de Liberia.**—A small brook flowing along the south side of the cemetery of Liberia (hence the name), hardly five minutes walk north of the town. The little ravine has rocky banks of volcanic material, said to be pumitic in character, whose surface is black when simply exposed to the weather, but which by wear is white and breaks down into a white sand. Here and there are sandy beaches. The rock of the bottom is grooved or worn into holes, some of them apparently pot-holes. Some of the grooves, a foot or more in depth, have been made or deepened by man. At the time I visited it (January 12, 1910), the water was more or less separated into pools, although still flowing slightly. Banks shaded with low trees and shrubs. Altitude about 500 feet.

**Quebrada de Salas.**—A brook a few rods east of Atenas Station on the Pacific Railroad, but west of the bridge over the Rio Grande de Tarcoles. Altitude 1600 to 1700 feet. It empties into the Rio Grande de Tarcoles south of the railroad. Collections were made north of the railroad. Very clear water, banks of brook rocky, shady, with tall trees and undergrowth. Farther up it flows through pastures. Salas is the name of the owner of a farm through which it flows.

**Rio de las Cañas.**—A tributary of the Rio Tempisque, coming from the western part of the northern end of the peninsula of Nicoya, flowing northeastwardly and eastwardly and emptying into the Tempisque east of Bolson. I collected on January 30, 1910, at a place on this river approximately north of the town of Santa Cruz. The river banks here were low and muddy with low twisted trees and low plants standing in the shallow water.

**Rio Reventado.**—On the southern slopes of Irazu volcano, a small rocky stream with fairly swift current, a short distance west of Cartago. Altitude 4650 to 5000 feet where collections were made.

**Rio Reventazon** (near Juan Viñas).—Altitude of the river here 2500 feet. Flows in the bottom of wooded valley 1500 feet deep. Valley sides steep. Various small brooks empty into river at short intervals. These and the rains make many moist spots. Here and there the bottom of the valley is wide enough to allow planting maize and other food-plants. On the valley sides many large forest trees, chiefly exogens, and much undergrowth. (See also Juan Viñas.)

**Rio Segundo.**—(See Alajuela.)

**Rio Surubres.**—A small tributary of the Rio Machuca on the Pacific slope. Our collecting was done near the Bonnefil Farm, where we were guests of Señor Pedro and Señorita Josefina Bonnefil. Altitude about 800 feet. The ravine occupied by the river is well wooded with a great variety of trees and there are also numerous species of plants in the undergrowth. The river was to the east and south of the farm. To the west and north was "charral," pasture that had subsequently grown up with bushes, patches of grass, thorny vines, and some palms (cojol palm, *Acromia vineria*, royal palm, *Oreodoxa regia*, and peji-baye, *Guilielma utilis*), guanacaste (*Enterolobium*) etc.

**Rio Tempisque.**—The chief river of the Province of Guanacaste arising near the Nicaraguan frontier, flowing south and southeastwardly and emptying into the upper end of the Golfo de Nicoya. At Filadelfia (formerly known as Siete Cueros), where I collected on January 18, 1910, the banks of the river were 30 feet above the water level, but at times (e. g., in October, 1908), we were told, the river overflows them. Even at this month of January, some miles further up stream, the river is too deep to be forded. The banks of this part of the river are sandy and with scanty vegetation. The collections made on January 18, 1910, were from a beach of mingled sand and small stones by the river side. Altitude between 50 and 70 feet.

**Rio Tiribi.**—May 16, 1909, on road from San José to La Verbená, at altitude 3500 feet.

**San Isidro.**—A small village four to five miles southwest of Cartago, near the foothills of the mountains which bound the valley of Guarco (in which Cartago lies) on the south. Character of the country much like that of Cartago.

**Santa Cruz.**—A town in the upper part of the peninsula of Nicoya, Province of Guanacaste. Altitude about 200 feet. North of the town, a few kilometers distant, on the road to Timpate, is a forest in which collections were made on January 27 and 28, 1910. This forest was quite dry at this time and there were very few orchids, bromeliads, or other epiphytes. There was a great variety in trees, both as to species and size, and much undergrowth both shrubs and herbs. Going north through this forest, which is interrupted by a pasture where cattle were grazing, we came to an open swamp, the Laguna Garzal, said to extend to the Rio de la Cañas. In the swamp is a spring of hot water (113° F.), visited, said to be hot throughout the year.

**Tierra Blanca.**—(See Toyogres.)

**Toyogres.**—A small brook on the southern slope of Irazu. Where the collection of April 6, 1910, was made, i.e., where the brook is crossed by the eastern road from Cartago to Tierra Blanca; the altitude is 5000 feet; the brook flows through pastures and is bordered by bushes here and there.

**Turrucares.**—Station on the Pacific Railroad, at altitude of about 2200 feet, 32 kilometers west of San José. Rio Siquiares was north of station, flowed through pastures, but was bordered



by a fringe of trees and rather low woods here and there. In the wood were many bull's-horn-thorns (*Acacia* spp.). River shallow, narrow (10-15-20 feet wide).

**La Verbena.**—A coffee farm near San José. Altitude about 3738 feet.

## PAPER 1.—A Partial Report on the Borboridae, Phoridae and Agromyzidae

BY J. R. MALLOCH <sup>1</sup>

### Plate I

This paper presents descriptions of several new species and records of others previously described in the families Phoridae, Borboridae, and Agromyzidae, which occur amongst the material collected by Dr. P. P. Calvert in Costa Rica, in the latter half of 1909 and early in 1910. All the types are in the Academy of Natural Sciences of Philadelphia.

It is possible that some of the species described herein as new may really be identical with European species, but unless in cases where I have very sound reasons for associating the forms, I have taken the course of giving to the Costa Rican insects names which will serve to distinguish them, in addition to the fullest possible description, which is in my opinion the safer plan than to link up two forms which, while very close in general appearance, may ultimately prove to belong to entirely different species.

One thing that strikes me in looking over the Borboridae is the absence of such species as *ferruginata* Stenh., and *crassimana* Hal. The former is cosmopolitan in its distribution and the latter is, while not recorded from so many different continents, very probably one of the species which occur almost everywhere in

<sup>1</sup> On account of the limited time Mr. Malloch was enabled to give to the study of the species of these families, the final preparation of this paper for publication, especially the preparation of the figures, was left to me. The descriptions and their accompanying notes are as Mr. Malloch prepared them. The figures were made with the aid of the camera lucida and are accurate except towards the base of the wings, where it was difficult to get the proper illumination, and no attempt has been made to correct such inaccuracies. In one or two cases the wings were more or less folded and the venation had to be worked out towards the hind margin. The only noteworthy case for correction is in figure 7 in which the third vein should be shown same as in figure 11.—E. J. CRESSON, Jr.

the same sort of situations as *fontinalis* Fall., which I find amongst the material before me. It is possibly due to the fact that *ferruginata* is a carrion frequenting species, or at times found on manure piles, that it does not occur in this collection, as very probably no collecting was done, or possible in such conditions. The number of species with maculated wings is evidently an indication of the presence of a large number of this form in tropical parts which are not represented in the temperate zones. I have seen two other species with wings maculated, viz.: *picturatus* Mall., from Philippine Islands, and *myrmecophila* K. and M. from ants' nests in Australia.

The Phoridae present no peculiarities, nor do the Agromyzidae that I have seen, both being similar to the North American forms in general appearance.

I have given tables of the species where the number present justifies this course.

## BORBORIDAE

### TABLE OF SPECIES IN LEPTOCERA

1. Disk of scutellum with short setulae.....**mitchelli** Malloch  
Disk of scutellum, bare..... 2
2. Wings with brown spots, either on the veins or on the disk..... 3  
Wings clear, or with faint indications of fuscous suffusion along veins,  
but never distinctly spotted..... 7
3. Large species, 2 mm. or more, frons and mesonotum with whitish  
pollinose spots at bases of bristles; wings clear on disk, the spots  
confined to veins and distributed as follows: one at beyond middle  
of first vein, one at apex of second vein, one on base of second and  
third veins, and another, generally less distinct, at apex of third  
vein.....**venalicia** Osten Sacken  
Smaller species, 1 to 1.75 mm.; mesonotum sometimes vittate but never  
punctate; wings with distinct spots on disk..... 4
4. Mesonotum yellow, browned posteriorly; legs yellow, bases of femora  
browned (fig. 11).....**meridionalis** new species  
Mesonotum black, with grayish white vittae; legs yellow, tibiae with  
brown rings..... 5
5. Mesonotum with 1 pair of dorso-central bristles, apex of wings clear  
(fig. 7).....**vittata** new species  
Mesonotum with two pairs of dorso-centrals..... 6
6. Anterior pair of dorso-centrals very long and strong; apex of wing in-  
fuscated (fig. 8).....**poeciloptera** new species  
Anterior pair of dorso-centrals weak; apex of wing clear (fig. 10)  
**monticola** new species

7. Wings whitish, second section of costal vein glossy black, contrasting with the other sections which are brownish in color (fig. 9)  
**varicosta** new species  
 Second section of costa not darker in color than other sections..... 8
8. Face, antennae, and legs yellow; mesonotum shining brown black, disk of scutellum velvety, opaque black or brown black. **fulva** Malloch  
 Species otherwise colored, scutellum never opaque on disk..... 9
9. Last section of second vein equal to basal section of third or very slightly longer, the second costal division less than half as long as third or barely one-half as long .....10  
 Last section of second vein distinctly longer than basal section of third, second costal division generally more than half as long as third...11
10. Third vein almost straight on its last section, reaching wing margin at very near to apex of wing.....**inconspicua** new species  
 Third vein bent almost rectangularly and reaching margin of wing at very much in front of apex of wing.....**bromeliarum** K. & M.
11. Small, glossy black species, antennae, legs and wing veins yellow (fig. 6)  
**pallicornis** new species  
 Larger, more or less shining species, legs brown, with yellow joints and tarsi and wing veins brown. The face is generally yellowish in the paler species when the antennae are of that color and thus there is not the striking contrast in color as represented in *pallicornis*.. 12
12. Post-humeral bristle present, incurved.....21  
 Post-humeral bristle absent.....13
13. Scutellum with four marginal bristles .....14  
 Scutellum with six or eight marginal bristles.....20
14. Very small species, .5 mm. in length; second costal division very distinctly shorter than third.....**minima** new species  
 Larger species, 1 mm. or over in length, second costal division as long as, or slightly shorter than third .....15
15. Third vein bent forward on its last section before reaching margin of wing; 2 or 3 pairs of dorso-centrals present.....16  
 Third vein straight or very slightly inclined forward; 1 or 2 pairs of dorso-centrals present.....17
16. Costa stopping at end of third vein, third vein slightly bent forward  
**cartagensis** new species  
 Costa carried distinctly beyond end of third vein; third vein distinctly bent forward.....**quadrissetosa** new species
17. Second vein almost rectangularly bent at its apex, the cell enclosed by this vein of almost equal width in its entire length.....18  
 Second vein joining costa at an acute angle, the cell enclosed by it distinctly narrowed apically.....19
18. Larger species, 2 mm. in length; last abdominal segment in male with a long hair-like bristle on either side; legs mostly brown-black (fig. 3).....**rectangularis** new species  
 Smaller species, 1.5 to 1.75 mm. in length; last abdominal segment with the apical hairs of a more uniform length; legs mostly yellow  
**regularis** new species

19. Second costal division subequal in length with third  
     **bisecta** new species  
     Second costal division very distinctly longer than third (3:2)  
     **inaequalis** new species
20. Scutellum with 8 bristles, the basal pair very weak; 3 pairs of dorso-centrals present; third vein bent forward; last two tarsal joints of fore pair slightly dilated in male..... **fontinalis** Fallon
21. Scutellum with several setulae on margins of disk in addition to the 8 marginal bristles which are unequal in length  
     **marginalis** new species  
     Scutellum with only marginal bristles, the disk bare.....22
22. Wings distinctly infuscated along the veins; outer cross vein at least half as long as the section of fourth vein between the cross vein  
     **fuscinervis** Malloch  
     Wings without distinct infuscation along veins; outer cross vein less than half as long as the penultimate section of fourth vein.....23
23. Larger species, 3 mm.; third vein distinctly bent forward (fig. 2) arista in male about equal in length to width of frons, in female slightly longer.....**brevisetia** new species  
     Smaller species, 1.5 to 2 mm.; third being slightly bent forward; arista in both sexes very much longer than width of frons  
     **m-nigrum** Malloch

**Leptocera (Limosina) mitchelli** Malloch

1913. *Leptocera mitchelli* Malloch, Proc. Ent. Soc. Washington, xv, 135.

There are 4 specimens of this species amongst the material from Cartago, January 1, 1910; same locality, November 21, 1909; near Tierra Blanca, April 6, 1910; and Juan Viñas, May 3, 1910.

**Leptocera (Limosina) venalicia** Osten Sacken

1858. *Borborus venalicia* Osten Sacken, Cat., 263.

There are 3 specimens amongst the material belonging to this species from the following localities: Juan Viñas, March 20, 1910, 2 specimens at 3000 feet altitude; 1, Verbena May 16, 1909.

**Leptocera (Limosina) poeciloptera** new species (Fig. 8.)

*Male*.—Black, slightly shining. Frons brown with a gray pollinose stripe on either side and a central stripe of same color which margins the frontal triangle; face and cheeks yellowish brown with distinct white pollinosity; antennae yellowish. Mesonotum brownish black, with a central grayish pollinose stripe and one on either lateral margin; pleural sutures yellowish. Abdomen shining black. Legs yellow, blackened on mid and hind coxae, all femora except at bases and apices, a broad band on the basal half of and apical fourth of all tibiae, apical tarsal joint darkened. Wings brownish gray, with hyaline spots arranged as in figure 8. Halteres brown, stalks yellow.

Frons occupying one-half the width of head, slightly narrowed anteriorly;

2 orbital bristles present; one on about middle which is directed slightly outward over the eye and the other almost in line with the posterior ocelli and directed slightly inward and backward; the normal central setulae represented in type by only 1 or 2 pairs near to anterior margin; antennae of moderate size, divergent but not lying very close to the eye; third joint barely larger than second, pilose, arista hair-like, slightly pubescent, geniculated at junction of second and third sections; cheek about one-half as high as eye; eye distinctly longer than high; vibrissae distinct, cheek bristles weak. Mesonotum with the normal pair of dorso-central bristles on posterior fourth, and a much stronger pair situated on the lateral pale stripes at about middle of mesonotum; discal setulae distinct, acrostichals arranged along margins of the central stripe; scutellum large, its length about equal to one-half that of the mesonotum, rounded in outline, four marginal bristles present, the basal pair much weaker than the apical pair, disk bare. Hypopygium large, knob-like; surface of abdomen with sparse hairs. Legs with short surface hairs; mid tibiae with 4 to 5 dorsal bristles, the two at apical third most distinct. Wing venation as in figure 8. There is a distinct fold which extends from before middle of discal cell to well beyond outer cross vein; costa with hairs but not spinose. Length, .75 mm.

*Holotype*.—Juan Viñas, May 3, 1910, near brook, forest edge, 2500 feet altitude. Type No. 6020.

**Leptocera (Limosina) vittata** new species (Fig. 7.)

*Male*.—Black, slightly shining. Frons yellow, ocellar spot blackened, orbits, a central stripe and margins of frontal triangle whitish pollinose; face yellow, cheeks blackened; antennae yellow; third joint darkened above. Mesonotum black-brown, with grayish pollinosity and 3 brown vittae, the outer one of which is broadest; scutellum concolorous with the mesonotum, with a subdistinct central pollinose stripe. Abdomen glossy black. Legs yellow, coxae blackened, all femora browned at bases; fore tibia with a narrow preapical blackish ring, mid and hind tibiae with two black bands, one near base and the other near to apex; apices of tarsi darkened. Wings spotted much as in *poeciloptera* but differing as shown in figure 7. Halteres black, stalk yellow.

Frons slightly over one-half the head width, becoming broader at just above the level of antennae, where there is a slight emargination of the eye; lower orbital bristle above middle of orbit, below it there are some weak orbital hairs; central setulae absent; cheek short; vibrissa and some marginal hairs distinct; eye about four times as high as cheek and very distinctly higher than long; antennae of moderate size; third joint pilose; arista geniculated, slightly pubescent. Mesonotum with one pair of dorso-central bristles, the anterior large pair in *poeciloptera* not distinguishable in this specimen (though it is not in very good condition); scutellum with 4 subequal marginal bristles, disk bare. Hypopygium large and knob-like, the ventral organ projecting claw-like; dorsum of abdomen with scattered hairs, hypopygium with 1.2 long hairs on left side at apex and scattered surface

hairs. Wings (fig. 7) with venation very similar to *poeciloptera* but the costa extends to distinctly beyond end of third vein while in that species it does not, the cross veins are not so closely approximated and the penultimate section of fourth vein is not so much deflected as to appear like a portion of the outer cross vein. Fore femora with rather long bristles on apical half of ventral surface; the other bristling of legs as in previous species. Basal joint of hind tarsus swollen, second joint elongated, but not so distinctly swollen as basal. Length, 1 mm.

*Holotype*.—♂, Juan Viñas, May 3, 1910, near brook, forest edge, 2500 feet altitude. Type No. 6021.

*Paratype*.—Juan Viñas, 2500 feet, near Rio Reventazon, June 28, 1909.

**Leptocera (*Limosina*) meridionalis** new species (Fig. 11.)

*Male*.—Yellow, ocellar region brownish. Mesonotum browned posteriorly and on lateral margins; scutellum browned; pleura with a black-brown mark longitudinally on middle from anterior to margin and the lower half blackened. Abdomen shining black-brown, last segment with inconspicuous pale posterior margin. Legs yellow, bases of all femora darkened. Wings with large brownish spots arranged as shown in figure 11. In cases where these markings are distinct they will present the appearance of three fasciae. Veins brown. Halteres clear yellow.

Frons half the width of head, outline less distinctly emarginate than in *vittata*; 2 orbital bristles present, as in *vittata*, the central setulae (2-3) present but very weak; antennae divergent, but not lying close to the eyes, of good size, the third joint slightly larger than second, pilose; arista geniculated, distinctly pubescent, its length about equal to 2 times the width of the frons; face concave in profile, the mouth margin produced; lower margin of eye with a rounded emargination; cheek as high as third joint of antennae, vibrissae distinct, the other hairs weak. Mesonotum with the prescutellar pair of dorso-centrals large and distinct, the pair just before level of wing base short and difficult to detect from the short discal setulae; no distinct pleural bristles on type; scutellum large, equal in length to rather more than half the length of mesonotum, disk bare, margin with 4 bristles, the apical pair longest. Abdomen with short surface hairs; hypopygium very large and knob-like, curved under abdomen. Legs slender; surfaces covered with short hairs; fore femora with distinct ventral bristles; mid tibial dorsal bristles weak; hind tarsus with basal joint swollen, less than one-half as long as the slightly swollen second joint and with it equalling the length of the other 3 joints. Wings with venation as in figure 11. Costa not extending beyond end of third vein; inner cross vein situated before end of second vein and about equal in length with outer; veins 4. 5 not traceable beyond the outer cross vein. Length, 1 mm.

*Holotype*.—Alajuela, 3100 feet altitude, swept, September 15, 1909. Type No. 6022.

**Leptocera (Limosina) monticola** new species (Fig. 10.)

*Male*.—Black-brown, shining. Head yellow; frons brown, sides of frontal triangle and orbits whitish pollinose; face glossy; cheeks opaque. Mesonotum shining black-brown with traces of three grayish vittae; pleura opaque, black-brown, yellowish along sutures; scutellum shining black-brown. Abdomen black, subshining; hypopygium glossy brown. Legs yellow, femora blackened, tibiae with brown rings on mid and hind pairs as in *vittata*, the ring on fore pair almost indistinguishable; tarsi with apical joint browned. Wings faintly marked as in figure 10; veins brown. Halteres brown.

Two orbital bristles present, the lower one projecting over eye; central setulae indistinguishable on frons; antennae divergent, but standing well clear of the eyes; arista bare, hair-like, in length about  $1\frac{1}{2}$  times the breadth of frons; cheek at highest part about equal to height of eye, the marginal bristles weak; vibrissa large, incurved. Mesonotum with 2 pairs of dorso-central macrochaetae, the anterior pair weak; discal setulae weak, arranged in 4 rows of rather irregular formation between dorso-centrals; scutellum bare on disk, 4 marginal bristles present, the anterior pair the weaker. Hypopygium large and incurved the central processes claw-like and covered with numerous stubby bristles, apex of hypopygium with short stiff hairs. Legs normal; hind tarsus with basal joint about one-half as long as the less thickened second joint; both together slightly less than equal to the length of other joints together. Wing venation as in figure 10; fourth vein traceable to half way to wing margin. Length, .75 mm.

*Holotype*.—Juan Viñas, May 2, 1910, forest brook, 2300 feet altitude. Type No. 6023.

**Leptocera (Limosina) varicosta** new species (Fig. 9.)

*Male*.—Glossy black. Frontal orbits sometimes with a whitish sheen; antennae clear yellow. Mesonotum unstriped. Abdomen opaque brown, yellowish on venter; hypopygium glossy brown. Legs black, apices of fore coxae, trochanters, bases of tibiae and tarsi yellowish. Wings whitish, veins yellowish brown, the second costal division glossy black. Halteres yellow, knob brown.

Head short, viewed from above at least twice as broad as long; frons raised in center, the orbits differentiated from central stripe; bristles very weak; 2 orbital bristles present, the lower one not projecting over eye; central stripe bare, antennae small, divergent but not lying close to eyes, third joint rounded; arista pubescent, in length about equal to twice the width of frons; cheek about as high as eye; marginal bristles weak, becoming stronger towards front, vibrissa weak but distinguishable. Mesonotum arched; 2 pairs of very weak dorso-centrals present, which are not easily distinguished from the numerous discal hairs; scutellum convex, rounded in outline, four marginal bristles present, the anterior pair weakest. Hypopygium covered with short hairs. Legs normal; mid tibial bristles weak.

Wings with venation as in figure 9; fourth vein very indistinctly traceable beyond outer cross vein. Length, .5 to .75 mm.

Females identical in color, etc., with male, except hypopygium.

*Holotype*.—♂, Alajuela, September 15, 1909, 3100 feet altitude, by sweeping. Type No. 6024.

*Paratypes*.—7 specimens same date; 2, Bonnefil farm, Rio Surubres, October 20, 1909, 800 feet altitude; 2, Peralta Station, August 10, 1909; 2, La Carpintera, December 4, 1909; 1, Cartago, October 27, 1909.

**Leptocera (*Limosina*) *fulva* Malloch**

1912. *Limosina fulva* Malloch, Smiths, Miss. Coll, lix, No. 17, 4.

Specimens of this species are amongst the material from the following localities: Peralta Station, August 10, 1909, one specimen; Alajuela, September 15, 1909, 3100 feet altitude, 11 specimens taken by sweeping; Turrucares, December 22, 1909, 1 specimen by sweeping over mud; Filadelfia, January 1, 1910, 2 specimens on muddy beach, Rio Tempisque.

Originally described from Panama.

**Leptocera (*Limosina*) *pallicornis* new species (Fig. 6.)**

*Male*.—Glossy black. Antennae and legs entirely yellow. Wings clear, veins yellow. Halteres brownish yellow.

Frons convex, orbits indistinguishable from central stripe which is highly glossy; orbital bristles weak, both jointing over eye, the central bristles weak but distinguishable; antennae divergent, but standing well clear of the eyes, third joint pilose; arista with slight pubescence, length of arista equal to  $1\frac{1}{2}$  times the width of frons; face slightly concave, produced at mouth margin; cheek at middle half as high as eye, marginal bristles distinct, vibrissae well differentiated, incurved; eye almost round, bare, facets rather large. Mesonotum with 1 distinct pair of dorso-centrals, the lateral bristles weak, setulae rather sparse and weak; scutellum convex, rounded in outline, 4 marginal bristles present, the basal pair weaker than apical. Abdomen short and broad, not as long as thorax; hypopygium knob-like, of moderate size. Legs slender, mid tibial bristles weak, in the male only the preapical dorsal bristle is distinct; hind tarsus with basal joint swollen and half as long as the less distinctly swollen second joint. Wing venation as in figure 6. Length, .5 mm.

*Female*. Same as male, except that the abdomen is broader, and the second costal division is rather longer.

*Holotype*.—♂, Juan Viñas, April 28, 1910, at brook near woods, 2600 feet altitude. Type No. 6025.



*Allotype*.—♀, Juan Viñas, May 1, 1910, forest brook, 4 p.m., 2500 feet altitude.

**Leptocera (Limosina) inconspicua** new species

*Female*.—Glossy black. Face and antennae brownish. Abdomen yellowish centrally. Legs dirty yellow, femora blackened except at bases and apices. Wings clear, costal vein brown, the others yellowish. Halteres yellow, knob black-brown.

Frons slightly broader than long; 2 orbital bristles present, the lower one slightly the weaker; central setulae very weak; antennae of average size, standing well clear of eyes; arista about twice as long as width of frons, hair-like, pubescence very slight; cheek at anterior margin about one-third as high as eye, becoming rapidly higher towards posterior margin; vibrissa distinct, behind vibrissa there is one much weaker setula and a very few weak hairs; eyes bare, higher than long; face distinctly concave in profile, produced between the eyes and at lower margin. Mesonotum without post-humeral bristles, and having one pair of dorso-centrals with a weak pair of setula about middle which represent the second dorso-centrals; disk with numerous, indiscriminately arranged, short hairs; scutellum bare on disk, four marginal bristles present. Abdomen as long as thorax, ovate, with sparse discal and apical hairs on segments. Legs normal, the mid tibial dorsal bristles weak, basal joint of hind tarsus about half as long as second joint. Wings with costa extending barely beyond end of third vein; third costal division twice as long as second; last section of second vein subequal in length with basal portion of third; outer cross vein at barely more than its own length from inner; vein 4 very indistinctly traceable to the wing margin; vein 5 abruptly discontinued at slightly beyond outer cross vein; last section of vein 3 straight, ending at very close to wing tip. Length, .75 mm.

*Holotype*.—♀, Cartago, December 12, 1909, from sweepings over muddy road. Type No. 6026.

*Paratype*.—Filadelfia, January 18, 1910, on muddy beach of Rio Tempisque.

**Leptocera (Limosina) bromeliarum** K. & M.

1912. *Limosina bromeliarum* K. & M. Ent. News, xxiii, 414.

There are 10 specimens in the material before me reared from unfolded leaves of *Heliconia mariae* from Rio Surubres, October 19, 1909.

**Leptocera (Limosina) minima** new species

*Male*.—Black. Head entirely black, frons shining. Mesonotum shining black. Abdomen subopaque black. Legs brownish the tibiae and tarsi brownish yellow. Wings clear, costa black, the other veins brown and very fine, veins 4 and 5 indistinguishable beyond outer cross vein. Halteres brown.

Frons convex; lower orbital bristle distinctly smaller than the upper; central divergent setulae distinct, 3-4 in number and as strong as the orbital bristles; antennae lying very close to the eyes, the face distinctly carinate, the anterior margin of it slightly behind the transverse line of the antennae; antennae of moderate size, third joint rounded, not larger than second, pilose; arista geniculated at junction of second and third joints, tapering, pubescent, in length equal to over  $1\frac{1}{2}$  times the width of frons; cheek about  $\frac{1}{3}$  the height of eye, marginal hairs weak, becoming very slightly stronger anteriorly, vibrissa strong, incurved; eyes bare, distinctly higher than long. Mesonotum with two pairs of dorso-centrals; discal setulae arranged in rows (8-10); post-humeral bristle absent; scutellum with 4 bristles, disk bare; outline of scutellum subtriangular. Abdomen cylindrical, almost bare, only a few weak hairs on apical segment and hypopygium; second segment slightly elongated; hypopygium of moderate size, not projecting much and not recurved. Legs without any conspicuous bristles, those on the mid tibia weak. Wings with costa to distinctly beyond the end of vein 3, first costal division slightly shorter than second, second about three-fourths as long as third, inner cross vein at below middle of last section of vein 2, outer cross vein at before end of vein 2, and almost as long as section of vein 4 between the cross veins, last section of vein 3 gently arcuate ending slightly in front of wing tip. Length, .5 mm.

*Holotype*.— $\sigma$ , Rio Tempisque, Filadelfia, swept over muddy part of beach, January 18, 1910. Type No. 6027.

**Leptocera (Limosina) cartagensis** new species

*Female*.—Brown black, opaque. Frons viewed from behind with an opaque black M-shaped mark, the spaces between the legs of the latter and beyond, gray pollinose; face shining black; antennae brown-black, third joint yellowish; cheeks brownish yellow. Mesonotum unstriped, opaque brown-black; scutellum and pleura concolorous with disk, sutures and their margins of the latter yellow. Abdomen darker than mesonotum, the posterior margins of segments narrowly yellowish, apical segment shining. Legs brownish yellow, fore coxae, all trochanters and mid femora paler. Wings clear, costal vein thick and black-brown, the other veins brown and not so distinct as costa, veins 4 and 5 very indistinct beyond outer cross vein, the latter only traceable for a short distance beyond that point. Halteres yellow, knob brown.

Frons slightly convex; both orbital bristles directed outward over the eye, the lower one slightly the weaker; orbits without additional hairs; central divergent rows of setulae distinct (3-4), distinctly convergent, the anterior pair weakest; antennae of moderate size, standing well clear of the eyes, third joint rounded and larger than second; bristles on second joint rather weak; arista hair-like, geniculated, pubescent, its length over  $1\frac{1}{2}$  times the width of the frons; cheeks at center one-third as high as eye, marginal hairs weak, at slightly anterior to middle there is a strong upcurved bristle which is about as strong as the vibrissa; face slightly concave, the

mouth margin slightly produced; eyes bare, almost round, Mesonotum without the post-humeral bristle and with 3 pairs of dorso-centrals, disk with rather strong setulae, arranged in about 10 rows, the central pair becoming stronger as they recede; scutellum with 4 marginal bristles, the basal pair slightly the weaker, disk bare, outline rounded, sterno-pleural bristle of moderate strength. Legs normal, no ventral bristles on mid tibia, and only the usual dorsal bristles present; basal joint of hind tarsus slightly over half as long as second. Wing with costa ceasing at end of vein 3 and distinctly before apex of wing, second costal division about  $1\frac{1}{2}$  times as long as third; second vein joining costa at an acute angle; basal section of vein 3 about one-third as long as last section of second and slightly longer than section of fourth between the cross veins; outer cross vein almost directly below middle of last section of second, and shorter than section of fourth vein anterior to its junction with that vein; last section of third vein gradually inclining forward but not distinctly bent as in *quadrisetosa*; costa with short setulose hairs to end of vein 1. Length, 1.5 mm.

*Holotype*.—♀, Cartago, May 25, 1909, in a ditch. Type No. 6028.

**Leptocera (Limosina) quadrisetosa** new species

*Male*.—In color rather darker than *cartagensis*. The face and cheeks are yellow and contrast more with the other parts of the insect than in the foregoing. The frons is not so noticeably pollinose and there is but little contrast between the stripes which carry the setulae and the other parts of frons. The wings are slightly grayish and the veins are more distinct, especially the costal vein which is very thick and black. Halteres yellow.

Frons with 2 orbital bristles, the lower slightly the smaller, both directed outward; several weak hairs on orbits besides the bristles; central setulae (3-4) distinct, decreasing in length anteriorly; face concave, mouth margin produced; antennae of moderate size, third joint rounded, larger than second; arista as in *cartagensis*; cheek slightly less than equal in height to breadth of third joint of antennae, one-third as high at middle as height of eye; marginal hairs rather numerous, in a double row, no central strong bristles on cheek, vibrissa strong, incurved. Mesonotum with 2 pairs of dorso-centrals; disk with numerous short setulae arranged in about 12 rows; scutellum subtriangular in outline, disk bare, 4 marginal bristles present, the basal pair slightly the weaker; disk slightly flattened. Abdomen cylindrical, shorter than thorax; hypopygium knob-like; the surfaces of all segments with numerous hairs. Legs rather stout; fore tarsi with the last 3 joints slightly flattened; mid tibiae with the usual dorsal bristles rather weak, and one weak ventral bristle; hind tarsus with basal joint much dilated and over half as long as the less dilated second joint. Wings with costa carried well beyond end of vein 3 but ceasing abruptly well before wing tip, very thick from end of first vein and tapering from end of second to its apex; second costal division slightly longer than third; angle at junction of vein 2 with costa obtuse; last section of vein 2 equal to  $2\frac{1}{2}$  times the

length of basal section of 3, basal section of 3 slightly longer than section of four between the cross veins; outer cross vein at before end of vein 2 and over half as long as section of 4 between cross veins; last section of vein 3 gradually but distinctly bent forward and ending well in front of wing tip; vein 4 very indistinct beyond outer cross vein, vein 5 only traceable for a short distance beyond that point; costa slightly hairy on its whole length but more distinctly so to end of first vein. Length, 1.5 to 2 mm.

*Holotype*.—♂, Cartago, January 3, 1910, sweeping over mud, Type No. 6029.

*Paratypes*.—One male and one female with same data.

**Leptocera (Limosina) rectangularis** new species (Fig. 5.)

*Female*.—Black shining. Anterior margin of frons, third antennal joint; cheeks, and tibiae brownish, fore coxae, trochanters, and bases of all femora yellowish. Wings slightly fuscous. Halteres black-brown.

Frons convex; lower orbital bristle distinctly weaker than the upper, both directed outward; orbits otherwise bare; central setulae strong (3-4), hardly reduced in size anteriorly; antennae of moderate size; third joint larger than second, rounded; second joint with the apical bristles distinct; arista hair-like, pubescent, almost twice as long as width of frons, antennae divergent but standing well clear of the eyes; face produced between the antennae, concave in profile, the mouth margin slightly produced; cheek about one-fourth as high as eye, marginal numerous but weak, arranged irregularly; no strong bristle on middle; vibrissa strong, incurved; eye bare, distinctly higher than long. Mesonotum with only 1 distinct pair of dorso-central bristles; post-humeral bristle absent; disk with about 14 rather irregular rows of short setulae; scutellum as in *quadrisetosa*. Abdomen ovate, shorter than thorax. Legs moderately strong; fore tarsi slightly thickened; mid tibia with a weak ventral bristle and the usual dorsal bristles. Wings venation as in figure 3. Length, 2 mm.

*Holotype*.—♀, Juan Viñas, May 2, 1910, forest brook, 3300 feet altitude. Type No. 6030.

*Paratypes*.—Cartago, January 3, 1910, sweeping over mud (♂ allotype); 2, Juan Viñas, May 2, 1910; 1, Alajuela, September 15, 1909.

The allotype differs from the male of the next species in having the hypopygium larger and the last abdominal segment with a very long hair on either side, as well as in being colored as the female.

**Leptocera (Limosina) regularis** new species

This species is similar to *rectangularis* in most respects, but differs in being distinctly smaller (1.5 to 1.75) and in the much paler color of the face, antennae, legs and halteres, which are yel-

lowish, slightly obscured by brown. The cheeks are also rather higher than in the foregoing and the wing veins are yellowish. The very conspicuous hair on the lateral margins of the last abdominal segment in *rectangularis* is not noticeable in this species. In all other respects the species are practically identical.

*Holotype*.—Juan Viñas, May 3, 1910, near brook, forest edge, 2500 feet altitude. Type No. 6031.

*Paratypes*.—3 specimens Juan Viñas, May 1–2, 1910, forest brook, 2500 feet altitude; 1 specimen, Alajuela, September 9, 1909, swept at 3100 feet altitude, and one specimen same locality on September 15, 1909; 1 specimen, Filadelfia, January 18, 1910; 1 specimen, Cartago, February 19, 1910.

**Leptocera (Limosina) bisecta** new species

*Male*.—Similar to the foregoing in color except that the halteres are yellow.

Frons opaque, grayish pollinose between the stripes on which the bristles are situated; lower orbital bristle slightly the weaker; central bristles 3 or 4 in number, decreasing slightly in size anteriorly; antennae divergent, but standing well clear of the eyes, of moderate size, third joint larger than second, pilose, yellowish on interior surface; arista tapering, pubescent, slightly more than  $1\frac{1}{2}$  times as long as width of frons; face concave, covered with grayish pollen; cheek less than one-third the height of eye, vibrissa strong, marginal hairs weak, buccal bristle present, pointing upward. Mesonotum with 2 pairs of dorso-centrals, the anterior pair weak, situated very widely apart at about midway on disk; post-humeral bristle absent; sternopleural bristle of moderate length; scutellum with 4 bristles. Abdomen cylindrical, shorter than thorax; hypopygium glossy black, very large, with 2 projecting ventral appendages, which are thorn-like in appearance, surface covered with short hairs. Fore tarsi slightly broadened; mid tibial bristles of moderate strength, no ventral bristles present; basal joint of hind tarsus about half as long as second. Wing with second costal division about equal to third in female, slightly shorter in male; costa carried very little beyond end of third vein; penultimate sections of veins 3 and 4 subequal; last section of third vein straight, ending slightly before wing tip; outer cross vein at about twice its own length from inner and slightly before end of second vein; veins 4 and 5 indistinct from very little beyond outer cross vein; costa with weak hairs. Length, 1.75 to 2 mm.

The female agrees except in the sexual organs and as pointed out in description. Three of the specimens in the series have the buccal bristle absent, but I believe from their condition that it has been rubbed off.

*Holotype*.—♂, Cartago, December 12, 1909, sweeping over muddy road. Type No. 6032.

*Paratypes*.—1 ♂ 1 ♀, same data as holotype; 1 ♂, Cartago, December 4, 1909; 1 ♀, Cartago, January 3, 1910, and 1 ♂, same locality, October 10, 1909; 1 specimen, Cartago, November 21, 1909; 2, Cartago, February 19, 1910.

**Leptocera (*Limosina*) *inaequalis***, new species

*Male*.—Brown, opaque, only the hypopygium shining. Face, cheeks, antennae, pleural sutures, and legs reddish yellow, more or less obscured with brown. Wings clear, costal vein black, the others pale brown. Halteres yellow.

Frons almost identical to that of *bisecta*; antennae as in that species; arista pubescent, about  $1\frac{1}{2}$  as long as width of frons; face concave; cheek increasing much in height posteriorly; buccal bristle distinct, marginal hairs very weak, vibrissa strong. Mesonotum with 3 pairs of dorso-centrals, the anterior 2 pairs weak; post-humeral bristle absent; discal setulae as in *bisecta*, numerous and of moderate strength; sternopleural bristle as in that species; scutellum with 4 bristles. Hypopygium smaller than in *bisecta* and without any projecting ventral appendages. Fore tarsus with the 3 apical joints about as broad as long, the whole tarsus slightly flattened; hind tarsus stout, the basal joint much dilated; bristles as in *bisecta*. Wing with second costal division about  $1\frac{1}{2}$  times as long as third; second vein joining costa at a very acute angle; costa ending abruptly at third vein; basal section of third vein slightly longer than penultimate section of fourth, outer cross vein about two-thirds as long as the latter, and at slightly beyond middle of last section of second vein; veins 4 and 5 distinct for a short distance beyond outer cross vein, the former traceable to wing margin; vein 3 almost straight on its last section, but with a distinct upward inflection and ending distinctly before wing tip; costa with short hairs to end of first vein. Length, 1.25 mm.

*Holotype*.—♂, Cartago, October 10, 1909, swept over mud. Type No. 6033.

*Paratype*.—Cartago, January 3, 1910, swept over mud.

**Leptocera (*Limosina*) *fontinalis*** Fallen

1826. *Copromyza fontinalis* Fallen, Dipt. Suec., Suppl. II, 16.

This species is represented in the material by specimens from the following localities: Cartago, October 27, 1909 to February 19, 1910, 23 specimens; Cachi, March 9–10, 3 specimens; near Isidro, August 21, 1909, 1 specimen; La Carpintera, December 4, 1910, 1 specimen.

The species is very widely distributed both in the old and in the new world and is generally met with near to marshy places or amongst decaying vegetation or manure.

**Leptocera (Limosina) marginalis** new species

*Male*.—Black, slightly shining. Face and cheeks brownish, obscured by grayish pollen; frons black, opaque except on the stripes on which the bristles are; antennae with third joint yellowish brown. Mesonotum and scutellum with slight traces of yellowish gray pollen; pleura subopaque, brown-black, sutures yellowish. Legs fulvous, fore tarsi, hind femora and tibiae brownish. Wings slightly browned, veins thick and brown. Halteres yellow.

Frons convex, distinctly over half the width of head; the pair of orbital bristles strong and of equal size; several weak hairs on orbits; central bristles strong and distinctly increasing in length anteriorly; face keeled, almost perpendicular in profile; labrum distinct; antennae of moderate size, standing well clear of apex; arista about  $1\frac{1}{2}$  times as wide as frons, pubescent; cheek broad, slightly less than half as high as eye; buccal bristle strong, a weaker upturned bristle posterior to it, the marginal hairs not very numerous, but setulose. Post-humeral bristle strong, incurved; 3 distinct pairs of dorso-centrals present; scutellum with 4 strong and 4 weak marginal bristles and several setulose hairs on lateral margins of disk. Abdomen much shorter than thorax, cylindrical; hypopygium not projecting, its surface with short hairs, last abdominal segment with several strong bristles. Legs normal in shape; mid tibia with one bristle at middle on ventral surface and another much stronger at apex, the dorsal bristles strong; mid trochanter with a strong bristle. Wing with bristles on costa to end of first vein; second costal division  $1\frac{1}{2}$  times as long as third; costa reaching to end of third vein; basal section of third vein subequal with penultimate section of fourth; outer cross vein at distinctly before end of second vein, and about one-third the length of the section of fourth vein before it; last section of third vein distinctly but not greatly bent forward, ending well in front of wing tip; last section of fourth vein distinct to margin of wing though not so thick as the outer veins; fifth vein carried beyond outer cross vein for a short distance. Length, 3 mm.

The female is identical with the male except in the sexual organs.

*Holotype*.—♂, Cartago, November 21, 1909, swept over mud. Type No. 6034.

*Paratypes*.—1 male, December 12, 1909, swept over muddy road, and 1 female same date as type from same locality.

**Leptocera (Limosina) fuscinervis** Malloch

1912. *Limosina fuscinervis* Malloch, Smiths. Miss. Coll. lix, No. 17, 6.

This species is represented amongst the Costa Rican material by specimens from the following localities: Cartago, October 27, 1909, 1 specimen; Cartago, February 19, 1910, 1 specimen; Cachi, March 10, 1910, 6 specimens taken at stagnant pool near bank of Rio Reventazon; Alajuela, September 15, 1909, swept at 3100 feet

altitude, 1 specimen; Rio Siquiares, Turrucare, December 19, 1909, 1 specimen; Juan Viñas, May 3, 1910, near brook, forest edge, 2500 feet altitude, 1 specimen.

These specimens run rather larger in size than the type in Washington but are evidently the same species. Originally described from Panama.

**Leptocera (Limosina) breviseta** new species (Fig. 2.)

*Male*.—Black, slightly shining. Frons, except on the stripes where the bristles are situated, grayish pollinose; face and cheeks gray pollinose. Mesonotum covered lightly with grayish pollen and generally with indications of a black (bare) central stripe; pleura opaque, black. Abdomen opaque black. Legs black, or with the bases of the tarsi brownish. Wings clear, veins brown. Halteres clear yellow.

Frons slightly convex; besides the 2 strong orbital bristles there are 2 or 3 setulae on inner margin of orbits; the central bristles are strong, distinctly lengthening towards anterior margin; antennae of moderate size, standing well clear of the eyes; arista pubescent, in length not exceeding the width of frons at vertex; face keeled, slightly concave in profile; labrum protruding; cheek over one-third the height of eye; buccal bristle long and strong, upcurved; vibrissa strong; eye as high as long. Mesonotum with the post-humeral bristle very strong, incurved; 3 pairs of dorso-centrals present; discal setulae numerous, acrostichals stronger than other setulae from near to anterior margin; pleura and scutellum as in *m-nigrum*. Abdomen shorter than thorax, ovate, flattened on dorsum, the second segment much elongated; hypopygium normal; apical segments of abdomen with several post-marginal bristles on lateral margins. Legs normal; mid tibia with dorsal bristles strong; 2 ventral bristles present, 1 near to middle, the other stronger at apex. Wing with venation as in figure 2; last section of third vein bend distinctly forward as in *fontinalis* Fallen. Length, 3 mm.

*Holotype*.—♂, Cartago, November 21, 1909, by sweeping over mud. Type No. 6035.

*Paratypes*.—Same locality as type, 2 specimens same date, and 1 specimen dated February 19, 1910.

**Leptocera (Limosina) m-nigrum** Malloch

1912. *Limosina m-nigrum* Malloch, Smiths. Miss. Coll. lix, No. 17, 7.

There are specimens of this species amongst the Costa Rican material from the following localities: Filadelfia, muddy beach of Rio Tempisque, January 18, 1910, 14 specimens; Cartago, from October 10, 1909, to February 19, 1910, 65 specimens; Peralta Station, August 10, 1909, 1 specimen; 1 specimen from Alajuela, September 9, 1909; La Carpintera, December 4, 1909, 3 specimens;



Cachi, March 9-10, 5 specimens; and 1 specimen from Turrucare, December 19, 1909.

Originally described from Panama.

**Sphaerocera pallipes** Malloch

1914. *Sphaerocera pallipes* Malloch, Ent. News, xxv, 31.

A single specimen taken at Turrucare, December 20, 1909, by sweeping over mud of a small stream north of Rio Siquiara. Agrees with the typical description except that the third and fourth veins are parallel.

PHORIDAE

**Dohrniphora setigera** new species

This species may be separated from *venusta* and its allies by the following characters:

Black, glossy; antennae and palpi yellow; abdomen opaque black; anal protuberance yellow; legs yellow more or less obscured with brown. Halteres black. Wings slightly infuscated at apex and along costa.

There are 2 strong post-antennal bristles on frons; the arista is almost bare; the palpi are broad and strongly bristled. The last abdominal segment has several strong posterior marginal bristles. The fore tibia has one strong bristle at basal third and a series of short setulae (6-7) from a short distance beyond it to apex; the hind tibia is bare except for a bristle at apex on dorsal surface and a series of short postero-dorsal setulae. Wings as in *venusta* but the costal bristles are about three times the length of the costal diameter. Length, 4 mm.

*Holotype*.—Cartago, January 3, 1910, swept over mud. Type No. 6036.

**Dohrniphora venusta** Coquillett

1895. *Phora venusta* Coquillett, Can. Ent. xxvii, 107.

There are a number of specimens referable to this species from Cartago and Alajuela in the material before me. They average both much larger and darker than specimens from the United States and West Indies.

**NEODOHRNIPHORA** new genus

This genus may be distinguished from all the other genera in the family by its possession of the following combination of characters: Frons with 3 rows of 4 bristles each, the post-antennal bristles being absent and their normal position occupied by the central pair of first row; antennae enlarged, third joint subconical,

arista terminal; proboscis not protruding; palpi normal. Scutellum exceptionally small, with 2 bristles. Male hypopygium much as in *Dohrniphora*, the anal protuberance very long, papilla like. Tibiae devoid of bristles except the apical spurs. Wings almost similar to those of *Dohrniphora* in venation.

Type of genus: *Neodohrniphora calverti* new species.

**Neodohrniphora calverti** new species

*Male*.—Yellow, slightly shining. Frons brown. Mid coxae with a black spot on posterior surface. Abdomen browned on sides of segments, leaving only a narrow yellow central stripe; hypopygium brown. Wings clear, veins brown. Knob of halteres blackened.

Frons with a subtriangular depression in front of ocelli, and a weak impressed line extending anteriorly from it for a short distance; width of frons slightly over that of either eye; length of frons about  $1\frac{1}{2}$  times its greatest width; central pair of bristles in preocellar row higher placed than outer pair; arista very slightly pubescent, its length equal to length of frons; palpi with a few black bristles; cheeks with several distinct bristles, no one of which is conspicuous. Mesonotum with 1 pair of dorso-centrals; scutellum 3 times as broad as long; anterior to the two strong bristles there are 2 very weak hairs on the lateral margins. Hypopygium large and knob-like, anal protuberance with 2 long end bristles. Legs normal in shape; fore coxa with 2-3 black bristles at apex; mid and hind coxae with more numerous and longer bristles at apices; hind femora with 2-3 long black bristles on basal half of ventral surface; all tibiae without distinct bristles or rows of setulae. Costa distinctly short of wing middle, first division almost  $1\frac{1}{2}$  times as long as 2-3; angle at fork of third vein acute; third section of costa about half as long as second; fringe fine and close; fourth vein almost straight at base and ending almost at wing tip. Length, 1.75 mm.

*Holotype*.—Alajuela, September 15, 1909, 3100 feet altitude. Type No. 6037.

This genus bears a resemblance to *Dohrniphora* Dahl, but the weak proboscis, small scutellum, and absence of leg bristles readily separate it from that genus.

Named in honor of Dr. P. P. Calvert.

**Hypocera crassineura** new species

*Male*.—Black. Frons glossy; thorax shining; abdomen dull black; hypopygium glossy, brownish. Antennae and palpi yellowish. Legs yellow-brown, mid and hind femora blackened, shining. Wings clear, costa and first and third veins black, the other veins indistinct. Halteres brown-black, yellowish at base of stalk.

Frons convex, distinctly broader than long; post-antennal bristles weak; three rows of bristles of 4 each on frons; antennae of moderate size, third joint rounded; arista shortly pubescent, its length equal to over  $1\frac{1}{2}$  times

the width of frons; palpi small, moderately bristled; vertex not raised; ocellar region not raised. Mesonotum with 1 pair of dorso-centrals; scutellum very small, with 2 long marginal bristles. Hypopygium exerted, of moderate size; anal protuberance but slightly protruding, hairy. Legs rather thick; fore tarsi thickened distinctly, the basal joint noticeably so; hind femora much thickened; fore tibia without bristles; mid tibia with the usual 2 at basal third, which are rather weak; hind tibia with 1 at middle on antero-dorsal surface. (These are all the bristles I can detect on the type, but the legs are in awkward positions for examination.) Costa to middle of wing, first division of costa slightly longer than second, fringe short, about equal in length to diameter of costal vein; third vein thickened, distinctly broader than costal vein; fourth vein gently arcuated, ending at a little before wing tip; veins 6-7 indistinct at apices. Length, 1.25 mm.

*Holotype*.—Alajuela, September 15, 1909, 3100 feet altitude, by sweeping. Type No. 6038.

***Apocephalus curvinervis*** new species (Fig. 1.)

*Female*.—Yellow, slightly shining. Frons brown, paler anteriorly. Antennae, proboscis, and palpi yellow. Abdomen with basal two-thirds of each segment dull black, apical third of each segment yellow; ovipositor brown-black, shining. Legs entirely yellow. Wings clear, costa browned beyond apex of third vein; veins brown, 4 and 5 slightly infuscated. Halteres yellow, knobs black.

Frons slightly longer than broad; vertical row of bristles normal, pre-ocellar row with the two center bristles in transverse line with lower margin of anterior ocellus, the outer pair close to eye margin and distinctly lower on frons; front row consisting of two large, divergent, post-antennal bristles which are not very closely approximated, and an outer pair close to eye margins distinctly above the level of these; surfaces of frons with numerous short setulae; ocelli very well developed; antennae of moderate size, third joint pear shaped, its apex not extending beyond the level of base of post-antennal bristles; arista bare, basal joints swollen and distinct, total length of arista equal to that of frons; proboscis small; palpi small with very few bristles; eye facets becoming larger as they near lower margin. Pleura bare; scutellum in type without any bristles, nor can I trace any marks that would indicate that there have been any present, though normally I should expect that there should be 2. Abdomen elongate, the ovipositor slightly longer than high, knife-shaped, the upper surface at apex with 2 small knob-like protuberances which have a few hairs on their surfaces. Legs elongate; hind femora with 3-4 bristly hairs on their basal fourth; hind tibial setulae very short, but distinct. Wing venation as in figure 1; fourth vein leaving at slightly beyond fork of third and bent downward at apex; costal fringe very short. Length, 2.5 mm.

*Holotype*.—Alajuela, September 15, 1909, swept at 3100 feet altitude. Type No. 6039.

If this species really has no scutellar bristles it will be peculiar in this respect, and I cannot trace any indications of their presence in the type specimen.

**PARAPHIOCHAETA** new genus

This genus may be distinguished from *Aphiochaeta* Brues, which has *nigriceps* Loew as type, by the presence of two rows of setulae on the hind tibiae (fig. 5), instead of the single row which is present in all the species in *Aphiochaeta*.

Type of genus: *Paraphiochaeta biseriata* new species.

**Paraphiochaeta biseriata** new species (Fig. 5.)

*Male*.—Reddish yellow, slightly shining. Abdomen with a large brown subtriangular mark on either side of each segment anteriorly, which show indications of coalescing. Legs entirely yellow. Wings yellowish tinged. Halteres yellow.

Frons narrow, occupying about  $1\frac{1}{2}$  as wide a space as either eye, its length distinctly more than equal to its greatest breadth; only 1 pair of post-antennals present; central pair of bristles of first row slightly below level of post-antennals and nearer to those than to eye margin, outer pair close to eye margin and situated much higher on frons; central pair of second row about midway between outer pairs of first and second rows; antennae small, third joint oval; arista slightly pubescent, in length slightly exceeding length of frons; palpi normal in size, moderately bristled; proboscis normal; cheek bristles short. Mesonotum with 1 pair of dorso-centrals; mesopleura with numerous short setulae and three bristles on posterior upper margin which increase much in length from the lower to the upper bristle; scutellum with 4 subequal bristles, the middle pair situated on disk instead of on margin as is usual. Second abdominal segment slightly the longest, its lateral surfaces with a few bristles; hypopygium normal in size, and protuberance of moderate size. Legs slightly elongated; fore coxae with 3-4 long black bristles at their apices; mid tibia with the antero-dorsal row of setulae confined to the basal half, the postero-dorsal row entire; hind tibia with both rows entire, the postero-dorsal row (10-11) much the strongest. Wings rather narrow, their length being equal to  $2\frac{1}{2}$  times their greatest width; costa extending to three-fifths the wing length, first division about two-thirds as long as second; fourth vein leaving at fork of third with a slight bend and ending with a slight droop at almost the wing tip; costal fringe very close and fine, in length barely exceeding the diameter of costal vein. Length, 2.75 mm.

*Holotype*.—Bonnefil Farm, Rio Surubres, October 16, 1909. Taken by sweeping at 800 feet altitude. Type No. 6040.

This genus will include several other American species which I placed in my "Group C." in my paper dealing with the Phoridae in the U. S. National Museum.

1. Frons glossy black.	2
Frons brown or yellowish, or if black then with distinct pollinosity, never glossy.	4
2. Hind femora with the basal third yellow, the remainder black; costal fringe about the length of the diameter of costal vein	
<b>femoralis</b> Enderlein	
Hind femora entirely brown or black; costal fringe at least twice as long as diameter of costal vein.	3
3. Base of wing clear yellow; costal fringe very close, the bristles about 5 times as long as diameter of costal vein; hind tibial setulae distinctly less than equal to diameter of tibia.	<b>littoralis</b> new species
Wing not yellow at base; costal fringe not very close, the bristles equal in length to about two times the diameter of the costal vein; hind tibial setulae at middle about equal to the tibial diameter	
<b>polita</b> Enderlein	
4. Frons deep black with grayish pollinosity on surface; black species; halteres yellow; costa slightly short of wing middle	
<b>pruinosa</b> new species	
Frons at most brown-black, sometimes shining; yellow or brown species; halteres black or yellow; costa generally to wing middle or beyond.	5
5. Halteres black or brown, never yellow.	6
Halteres yellow.	10
6. Costal fringe short and close, 12 bristles occurring from above end of first vein to anterior fork of third; fork of third vein acute	
<b>sylvicola</b> new species	
Costal fringe long and much more widely separated.	7
7. Costa reaching to distinctly beyond middle of wing.	8
Costa reaching to wing middle or short of it.	9
8. Hind tibial setulae very indistinct and weak; first costal division not longer than second.	<b>flavopleura</b> new species
9. Mesopleura with short bristles.	<b>latimanus</b> new species
Mesopleura bare.	<b>alajuelensis</b> new species
10. Robust species; halteres with knob lemon yellow; costal fringe short and close, 12 bristles from end of vein 1 to anterior branch of fork of 3; fork very small; ♂ hypopygium with 4-5 strong bristles on either side ventrally.	<b>seticauda</b> new species
Comparatively slender species; halteres reddish yellow.	11
11. Costal fringe short and close, the length of the bristles being about twice the diameter of the costal vein or less.	12
Costal fringe much longer than above.	13
12. Costa very weak haired (fig. 4); veins very weak on disk of wing; legs with soft hairs, no distinct setulae on hind tibia	
<b>pilosa</b> new species	

- Costa with distinct, though short, setulae; legs not particularly hairy, hind tibial setulae distinct.....**rectangulata** new species
13. Black-brown species; hind tibial setulae very long, equalling at their longest part the diameter of tibia.....**exaltata** new species
- Yellow species; hind tibial setulae generally very much shorter than diameter of tibia.....**lutea** Meigen

**Aphiochaeta femoralis** Enderlein

1912. *Aphiochaeta femoralis* Enderlein, Ent. Zeit., 1912, 30.

There are 3 specimens belonging to this species in the material before me from the following localities: Alajuela, September 8, 1909, 3100 feet altitude, swept over brook; near Cartago, December 15, 1909, south slope of Irazú, over mud, 5000 feet altitude; and Turrucare, December 22, 1909, swept over mud.

To the description given by Enderlein I may add that the mesopleura are bare.

**Aphiochaeta littoralis** new species

*Male*.—Shining black. Frons glossy black, palpi yellow. Legs black-brown, fore pair, including coxae, yellow, bases of mid and hind tibiae yellowish. Wings yellow at base, veins brown. Halteres black.

Lower pair of post-antennal bristles about three-fourths as large as upper pair; first row of frontal bristles convex; antennae of average size; palpi large, rather strongly bristled. Scutellum with 2 bristles; mesopleura bare. Abdomen rather broad, soft haired; anal protuberance yellow, large. Legs strong; fore tarsi slightly thickened; hind femur with 2-3 short bristles on ventral surface at apical third; hind tibial setulae (8-9) increasing in size from base to near apex, the largest slightly shorter than tibial diameter. Costa to beyond wing middle; first division shorter than second, the angle formed by junction of first vein with costa acute; fork of third vein at an obtuse angle; fourth vein leaving at beyond fork of third with a decided curve and ending slightly recurved at in front of wing tip; costal fringe long, close and rather shaggy. Length, 1.75 mm.

*Holotype*.—♂ near San Isidro, August 21, 1909, swept near river. Type No. 6041.

*Paratype*.—Same data.

**Aphiochaeta polita** Enderlein

1912. *Aphiochaeta polita* Enderlein, Stett. Ent. Zeit., 1912, 30.

There are 2 specimens referable to this species amongst the material I have before me from Alajuela, September 8, 1909, swept over brook, 3100 feet altitude.

The mesopleura in this species are bare.

**Aphiochaeta pruinosa** new species

*Male*.—Black shining. Frons covered with grayish pollinosity, palpi yellow. Mesonotum slightly pollinose; pleura shining, the upper third pollinose. Abdomen colored as mesonotum; anal protuberance yellow. Legs black-brown, fore pair and bases of posterior pairs of tibiae yellowish. Halteres yellow. Wings clear, veins black-brown.

Frons with distinct central furrow, as in *litoralis*, lower post-antennal bristles minute, upper pair and all frontal bristles strong; central bristles in first row distinctly lower on frons than outer pair; third antennal joint above the average size; arista pubescent, slightly lower than frons; palpi normal in size and bristling. Scutellum with 4 bristles, the basal pair the weaker; mesopleura bare. Abdomen rather broad; second segment with 4-5 lateral bristles; anal protuberance large, the apical hairs present. Legs stout; fore tarsi slightly broadened throughout their entire length; hind femora bare ventrally at apex; hind tibial setulae of moderate strength. Costa to slightly short of wing middle; first division distinctly, but not greatly larger than 2+3; the angle at junction of vein 1 with costa obtuse; fork of third forming an obtuse angle; fourth vein gently arcuate; costal fringe close and of moderate length, each bristle being about 3 times as long as costal diameter. Length, 2 mm.

*Holotype*.—Near Cartago, December 15, 1909, south slope of Irazú, over mud. Type No. 6042.

**Aphiochaeta sylvicola** new species

*Female*.—Shining brown-black. Frons slightly pollinose; antennae brown; palpi yellow. Mesonotum slightly pollinose; pleura glossy, the upper portions pollinose. Abdomen opaque black. Legs brown, fore pair, including coxae, clear yellow, mid and hind pairs with tibiae yellowish. Wings clear, veins brown. Halteres black-brown.

Frons slightly broader than long; central furrow distinct; lower pair of post-antennal bristles very minute, upper pair strong; central pair of bristles in first row almost in transverse line with upper post-antennals and slightly lower than outer pair in same row, the latter more widely separated from the central pair than that pair are from the post-antennals; surface hairs on frons very short and close; antennae normal in size and shape; arista pubescent, distinctly longer than frons; palpi as large as third antennal joint, moderately bristly. Mesonotum with short dark surface hairs; mesopleura bare; scutellum with 2 bristles and 2 weak hairs. Abdomen ovate; second segment with 3-4 hair-like bristles on lateral margins. Fore tarsi slightly thickened; hind femora with short hairs on the ventral surface; hind tibial setulae 8-9 in number, increasing in size to beyond middle and then slightly decreasing, the longest part not equal to the tibial diameter. Wing with costa to distinctly beyond middle, first and second costal divisions subequal, angle of fork of third vein acute; fourth vein leaving with a gentle curve at slightly beyond fork and ending, recurved, at well in

front of wing tip; costal fringe about twice the length of costal diameter, regular and close. Length, 2 mm.

*Holotype*.—Juan Viñas, May 2, 1910, forest brook, 3300 feet altitude. Type No. 6043.

***Aphiochaeta flavopleura* new species**

*Female*.—Shining brownish yellow. Frons glossy dark brownish; antennae yellowish; palpi yellow. Pleura pale yellow, becoming darker on upper third. Abdomen opaque dark brown. Legs yellow, the posterior pair slightly obscured with brown. Wings with a slight yellow tinge, veins brown. Halteres black-brown.

Frons with distinct central furrow; lower pair of post-antennal bristles about half as large as the strong upper pair; central pair of bristles in first row incurved, situated in transverse line with the upper post-antennals and almost directly in vertical line with the outer pair in same row; surface hairs not so close and larger than in *sylvicola*; antennae normal; arista pubescent, distinctly longer than frons; palpi narrow, the bristles rather numerous and strong. Mesopleura bare; scutellum with 2 bristles. Abdomen slender, second segment without distinct bristles. Legs normal; hind tibia without distinct setulae. Wings with costa to beyond middle, first division slightly shorter than second; angle at apex of first vein acute; angle at fork obtuse, almost a right angle; fourth vein leaving at beyond fork with a slight bend and ending, recurved, at well in front of wing tip; costal fringe about 4 times as long as costal diameter. Length, 1.5 mm.

*Holotype*.—♀, Rio Siquiaries, Turrucare, December 19, 1909. Type No. 6044.

*Paratype*.—Alajuela, September 8, 1909, sweeping over brook, 3100 feet altitude.

***Aphiochaeta latimanus* new species**

*Male*.—Black-brown shining. Frons glossy, almost black; palpi brown. Pleura yellowish brown, shining. Abdomen opaque, black. Legs brownish yellow. Wings slightly grayish, veins heavy, brown. Halteres black-brown.

Frons with distinct central furrow; lower pair of post-antennal bristles almost as large as upper pair; central pair of bristles in first row slightly below upper post-antennals and well below the outer pair in same row though not nearly in vertical line with these; surface hairs on frons rather long; antennae small; arista pubescent, distinctly longer than frons; palpi larger than antennae, strongly bristled. Mesopleura with numerous short bristles; scutellum poorly preserved but with 2 bristles remaining. Abdomen tapering, second segment without distinct bristles, surface of all segments slightly haired; anal protuberance not large. Legs with fore tarsus flattened, joints 2 and 3 subequal, both together shorter than metatarsus, and equal to joint 4 which is subequal with 5; hind tibial setulae distinct



but not strong. Wings with costa to middle; first division subequal with second, angle at apex of first vein slightly obtuse; angle at fork of third obtuse; third section of costa about one-third as long as second; fourth vein as in *flavopleura*; costal fringe very long, about 6 times as long as costal diameter; only about 7 bristles from end of vein 1 to fork. Length, 1.5 mm.

*Holotype*.—Cartago, October 10, 1909, sweeping over mud. Type No. 6045.

***Aphiochaeta alajuelensis* new species**

*Male*.—Almost identical in coloration with *flavopleura*, the halteres only being rather paler in color.

Frons with distinct central furrow; lower pair of post-antennal bristles very small, upper pair strong; center pair of bristles in first row incurved, situated very close to outer pair and comparatively far separated from the post-antennals; surface hairs short and numerous; antennae of good size, third joint slightly pointed; arista shortly pubescent, its length slightly more than equal to that of frons; palpi larger than third antennal joint, strongly bristled. Abdomen tapering; surface with pale hairs; hypopygium of moderate size; anal protuberance normal, yellow; ventral organs protruding, pale yellow. Fore tarsus normal; hind tibial setulae distinct but weak. Wing with costa to middle; first division slightly longer than second, angle at apex of vein 1 acute; angle at fork obtuse; fourth vein as in *latimanus*; costal fringe long, about equal in length to four times the costal diameter, 5-7 bristles from end of vein 1 to fork. Length, 1.5 mm.

*Holotype*.—♂, Alajuela, September 15, 1909, swept, 3100 feet altitude. Type No. 6046.

*Paratypes*.—1 male same locality as type, swept over brook, September 8, 1909; one female, Turrucare, December 22, 1909, swept over mud.

***Aphiochaeta seticauda* new species**

*Male*.—Black-brown, subshining. Frons almost black, the surface pollinose. Antennae brownish yellow; palpi yellow. Pleura yellow, upper portions brownish. Abdomen opaque, posterior margins narrowly yellow; anal protuberance clear yellow. Legs yellow, apices of hind femora black. Wings clear, veins yellowish. Halteres with brown stalk and lemon yellow knob.

Frons with very distinct central furrow; only 1 pair of distinct post-antennals present; central pair of bristles in first row situated well below level of outer pair and much nearer to center of frons; outer pair not very close to eye margin; surface hairs very short; antennae large, about  $\frac{2}{3}$  as large as eye, third joint oval, darkened above; arista about  $1\frac{1}{2}$  times as long as frons, indistinctly pubescent; palpi smaller than antenna, moderately bristly. Mesopleura bare; scutellum with 2 bristles. Abdomen broad at base, tapering posteriorly; second segment elongated, 3-4 distinct bristles on lat-

eral margins. Hypopygium very large, laterally with several strong bristles; anal protuberance very long, its surface with numerous hairs, apical hairs present. Legs strong, fore tarsi normal; posterior tibia with strong setulae, almost equalling the tibial diameter. Costa to slightly short of wing middle; first costal division distinctly shorter than second; angle at apex of vein 1 not acute; fork of third vein very small, the enclosed space not broader than the veins enclosing it; fourth vein slightly bent at base, and running almost straight to wing margin, ending at slightly in front of wing tip; costal fringe about  $1\frac{1}{2}$  times the costal diameter. Length, 2.25 mm.

*Female*.—Similar to the male except in the form of the abdomen.

*Holotype*.—♂, South slope of Irazú, near Cartago, 5000 feet altitude, December 15, 1909. Type No. 6047.

*Allotype*.—♀, same locality and data.

**Aphiochaeta pilosa** new species (Fig. 4.)

*Female*.—Black-brown. Antennae and palpi brownish yellow. Legs reddish yellow. Halteres yellowish. Wings clear, veins yellow, those on disk of wing very pale. Bristles and hairs yellow.

Frons with the suture indistinct; post-antennal bristles almost erect, rather weak; first row of bristles as in previous species; surface hairs long; third antennal joint globose, rather small; arista swollen at base, pubescent, in length about equal to length of frons; palpi narrow, moderately bristled. Mesonotum with the surface hairs of good length; pleura and scutellum in poor condition. Abdomen narrow, surface with yellow hairs. Legs rather long, fore tarsi thickened, throughout their entire length as wide as tibia; hind tibia without any dorsal ridge or setulae, mid tibial spur weak, hind tibia with apical spurs very minute; all legs with soft surface hairs. Wing with costa to distinctly beyond middle, first division subequal with second, angle at apex of vein 1 not acute; angle of fork very obtuse, almost rectangular, the inner branch very thin and weak; fourth vein leaving at fork with a distinct bend and running nearly straight to near wing tip; costa very short and close haired (fig. 4). Length, 1.5 mm.

*Holotype*.—Alajuela, September 8, 1909, swept over brook, 3100 feet altitude. Type No. 6048.

This species may really belong to the genus *Beckerina*, but from its rather unsatisfactory condition I am unable to say definitely.

**Aphiochaeta rectangulata** new species

*Female*.—Yellow. Frons brown, surface pollinose; antennae reddish yellow, palpi clear yellow. Mesonotum slightly shining reddish yellow; pleura yellow. Abdomen brownish, the dorsum yellow. Legs yellow. Wings clear; veins brownish yellow. Halteres yellow.

Frons with distinct central furrow; lower post-antennal about half the size of the strong upper pair; center pair of bristles in first row distinctly

below the outer pair and nearer to them than to the post-antennals; surface hairs very short; antennae normal; arista pubescent, longer than frons; palpi normal. Mesopleura bare; scutellum with 2 bristles. Anal segments bristled at the apices. Legs normal; hind tibial setulae about half as long as the diameter of tibia. Wing with costa to middle; first costal division equal to 2+3; angle at apex of vein 1 acute; fork of third vein almost rectangular; fourth vein arcuate, finishing in front of wing tip; costal fringe about three times as long as diameter of costa. Length, 1.25 mm.

*Holotype*.—Alajuela, September 15, 1909, swept at 3100 feet altitude. Type No. 6049.

**Aphiochaeta exaltata** new species

*Female*.—Black-brown, shining. Frons slightly pollinose; antennae brownish yellow; palpi yellow. Abdomen black, shining at apex. Legs black-brown, fore legs paler, the tibiae and tarsi yellowish; apices of mid and hind femora yellow, mid tibia yellowish, base and apex of hind tibia yellow, tarsi yellow. Wings clear, veins black-brown. Halteres with yellow knobs.

Frons with distinct suture; upper pair of post-antennal bristles widely separated and placed very high on the frons being about in line with midway between the central and outer bristles of first row; lower post-antennals very close together and about three-fourths as large as upper pair; central pair of bristles in first row much lower on frons than outer pair and not much further from eye margin than these; surface hairs short; antennae small, third joint round; arista pubescent, distinctly longer than frons; palpi slightly dilated, moderately bristly. Mesopleura bare; scutellum with 2 bristles. Abdomen with the segments subequal; the lateral margins of second segment with only weak hair-like bristles. Legs very strong, hind femora dilated; fore tibia with dorsal setulae; hind tibial setulae very strong; hind tibia with double row of setulae. Wing with costa to wing middle, first division slightly shorter than second; angle at apex of first vein acute; fork of third weak rather acute; costal fringe strong and long; fourth vein leaving at slightly before fork, curved at base and ending well in front of wing tip. Length, 1.75 mm.

*Holotype*.—Alajuela, September 8, 1909, swept over brook, 3100 feet altitude. Type No. 6050.

**Aphiochaeta lutea** Meigen

1830. *Phora lutea* Meigen, Syst. Besch., vi, 219.

There are four specimens amongst the material before me which evidently belong to this species. The localities are: Rio Siquiaries, Turrucare, August 14, 1909, 2200 feet altitude; Rio Surubres, October 21, 1909, 2 specimens by sweeping at 800 feet altitude; and 1 near Tierra Blanca, April 6, 1910.

**Puliciphora flava** new species

*Male*.—Yellow. Abdomen dark brown. Wings clear, veins brown. Halteres yellow.

Frons weakly bristled, the surface with yellow hairs; arista pubescent, longer than width of frons; palpi of good size, distinctly bristled. Scutellum with 2 bristles. Hypopygium large and protruding. Legs strong and long; mid and hind tibial spurs very minute. Wings with costa to distinctly beyond the middle; first costal division half as long as second, costal fringe shorter than diameter of costal vein; fourth vein almost straight, seventh vein distinct. Length, 1 mm.

*Holotype*.—Rio Siquiares, Turrucars, August 14, 1909, 2200 feet altitude. Type No. 6051.

## AGROMYZIDAE

**Agromyza meridionalis** new species

*Female*.—Shining black. Head yellow, only the ocellar region, orbits posteriorly, and back of head black; arista darkened. Mesonotum with lateral margins broadly lemon yellow, the upper margins of pleura and central vertical suture narrowly margined with same color. Legs shining black, only the fore knees narrowly yellowish. Wings slightly grayish, veins black. Squamae and halteres lemon yellow.

Frons narrow, distinctly narrower than width of either eye; four orbital bristles present; orbits bare except for the large bristles; antennae of moderate size, second joint with distinct dorsal bristle, third joint rounded in front; arista tapering at base, slightly pubescent, its length equal to from its base to vertex; cheek at posterior margin slightly more than equal to width of third antennal joint, marginal hairs distinct; vibrissa slightly differentiated; eyes higher than long, bare. Mesonotum with 2 distinct pairs of dorso-central bristles, the disk covered with numerous short setulae, the pair of bristles usually present between the posterior dorso-centrals not differentiated from the other setulae. Legs stout; the normal pair of bristles on posterior surface of mid tibiae very weak. Wings with costa to fourth vein; veins 3-4 divergent; fourth vein ending at wing tip; inner cross vein at slightly beyond middle of discal cell; outer cross vein at about its own length from inner and directly below end of first vein; last section of fifth vein rather more than twice as long as penultimate section. Length, 1.5 mm.

*Holotype*.—♀, Alajuela, September 15, 1909, taken by sweeping at an altitude of 3100 feet. Type No. 6052.

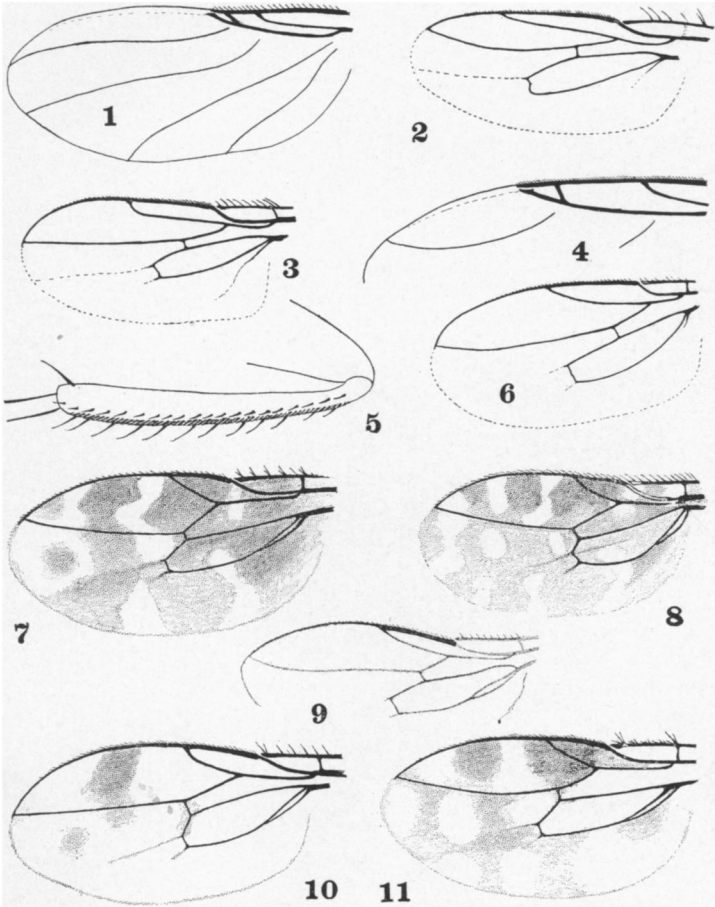
*Paratypes*.—3 specimens with same data.

This species belongs to the same group as *platyptera* Thomson, but the color of the antennae, long arista, and bristling of the mesonotum readily separate it from that species. In its stout build and black legs, as well as the wing venation it most closely resembles *platyptera* amongst the American species.

## EXPLANATION OF PLATE I

- FIG. 1.—*Apocephalus curvinervis*, wing  $\times 35$ .  
“ 2.—*Leptocera breviseta*, wing  $\times 35$ .  
“ 3.— “ *rectangularis*, wing  $\times 35$ .  
“ 4.—*Aphiochaeta pilosa*, wing in part  $\times 55$ .  
“ 5.—*Paraphiochaeta biseriata*, hind tibia  $\times 55$ .  
“ 6.—*Leptocera pallicornis*, wing  $\times 35$ .  
“ 7.— “ *vittata*, wing  $\times 55$ .  
“ 8.— “ *poeciloptera*, wing  $\times 55$ .  
“ 9.— “ *varicosta*, wing in part  $\times 55$ .  
“ 10.— “ *monticola*, wing  $\times 55$ .  
“ 11.— “ *meridionalis*, wing  $\times 55$ .

Note that the magnification is linear.



MALLOCH—COSTA RICAN DIPTERA